

## Topic Page: [Fungi](#)

Definition: **Fungi** from *Stedman's Medical Dictionary*

(fŭn'jī). A kingdom of eukaryotic organisms that grow in irregular masses, without roots, stems, or leaves, and are devoid of chlorophyll or other pigments capable of photosynthesis. Each organism (thallus) is unicellular to filamentous, and possesses branched somatic structures (hyphae) surrounded by cell walls containing glucan or chitin or both, and containing true nuclei. They reproduce sexually or asexually (spore formation), and may obtain nutrition from other living organisms as parasites or from dead organic matter as saprobes (saprophytes). see also kingdom. [L. *fungus*, a mushroom]



Image from: [Light micrograph of the mycelium of an... in Encyclopedia of Paleontology](#)

### Summary Article: **Fungi**

From *The Columbia Encyclopedia*

(fŭn'jī), kingdom of heterotrophic single-celled, multinucleated, or multicellular organisms, including yeasts, molds, and mushrooms. The organisms live as parasites, symbionts, or saprobes (see saprophyte). Previously classified in the plant kingdom, fungi are nonmotile, like plants, but lack the vascular tissues (phloem and xylem) that form the true roots, stems, and leaves of plants. Most coenocytic (multinucleated) or multicellular fungi are composed of multiple filaments, called hyphae, grouped together into a discrete organism called a mycelium. The cell walls of most fungi are of chitin compounds instead of cellulose; a group of fungi known as cryptomycota lack chitinous cell walls. In many ways fungi are more closely related to animals than to plants, and they have been thought to share a common protist ancestor with animals. A recent classification system suggested by nucleic acid (genetic material) comparisons places the fungi with the animals and the plants in an overarching taxonomic group called the eukarya.

Most fungi are capable of asexual and sexual reproduction. Asexual reproduction is by fragmentation or spore formation. Those that reproduce sexually produce gametes in specialized areas of the hyphae called gametangia. The gametes may be released to fuse into spores elsewhere, or the gametangia themselves may fuse. In some cases dikaryons [*di* = two, *karyo* = nucleus], which are found only among fungi, result when unspecialized hyphae fuse but their nuclei remain distinct for part of the life cycle.

Unlike algae or plants, fungi lack the chlorophyll necessary for photosynthesis and must therefore live as parasites or saprobes (see parasite). Typically they release digestive enzymes onto a food source, partially dissolving it to make the necessary organic or inorganic nutrients available. Some parasitic types obtain their food directly from the cells of a living food source. Some types of fungi are involved in symbiotic relationships, for example, lichens (a combination of a fungus, a green alga or a cyanobacterium, and sometimes a basidiomycete yeast) and the mycorrhizae (symbiosis between a fungus and the roots of a vascular plant).

Some fungi are pathogenic to humans and other animals. Such diseases are called mycoses or fungal infections. Some molds, in particular, release toxic chemicals called mycotoxins that can result in poisoning or death. Various fungi can also cause serious damage to fruit harvests and other crops (see diseases of plants).

## Types of Fungi

The 100,000 identified species of organisms commonly classed together as fungi are customarily divided into four phyla, or divisions: Zygomycota, Ascomycota, Basidiomycota, and Deuteromycota.

Zygomycota includes black bread mold and molds, such as those of the genus *Glomus*, that form important symbiotic relationships with plants. Most are soil-living saprobes that feed on dead animal or plant remains. Some are parasitic of plants or insects. They reproduce sexually and form tough zygospores from the fusion of neighboring gametangia. There is no distinguishable male or female.

Ascomycota includes yeasts, the powdery mildews, the black and blue-green molds, edible types such as the morel and the truffle, and species that cause such diseases of plants as Dutch elm disease, chestnut blight, apple scab, and ergot. There are over 50,000 species, about 25,000 of which occur only in lichens. In ascomycetes, the hyphae are subdivided by porous walls through which the cytoplasm and the nuclei can pass. Their life cycle is a complex combination of sexual and asexual reproduction.

Basidiomycota includes the gill fungi (most mushrooms), the pore fungi (e.g., the bracket fungi, which grow shelflike on trees, and an edible type called tuckahoe), and the puffballs. It also includes the fungi that cause smut and rust in plants. Like ascomycetes, the hyphae are subdivided by porous walls. In basidiomycetes, two hyphae fuse to form a dikaryotic mycelium (a mycelium in which both nuclei remain distinct). These mycelia differentiate into reproductive structures called basidia that make up the basidiocarp (the body popularly known as the mushroom cap). The nuclei then fuse and undergo meiosis, creating spores with one nucleus each. When these spores germinate, they produce hyphae, and the process begins again.

Deuteromycota comprises a miscellaneous assortment of fungi that do not fit neatly in other divisions; they have in common an apparent lack of sexual reproductive features. Also called Fungi Imperfecti, the group includes species that help create Roquefort and Camembert cheeses, that cause diseases of plants and of animals (e.g., athlete's foot and ringworm), and that produce penicillin. A number of the fungi classified as deuteromycetes have been found to be asexual stages of species in other groups, and some classification schemes consider the deuteromycetes a class under Ascomycota.

## Usefulness of Fungi

Fungi are valuable economically as a source of antibiotics, of vitamins, and of various industrially important chemicals, such as alcohols, acetone, and enzymes, as well as for their role in fermentation processes, as in the production of alcoholic beverages, vinegar, cheese, and bread dough. They are extremely important in soil renewal, through the decomposition of organic matter (see humus)—a function unwelcome when it results in the rotting of clothing and other goods and the spoilage of foods.

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## Harvard

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